Goose Lake Valley Groundwater Basin, Lower Goose Lake Valley Subbasin

- Groundwater Basin Number: 5-1.01
- County: Modoc
- Surface Area: 36,000 acres (56 square miles)

Basin Boundaries and Hydrology

The Lower Goose Lake Valley Groundwater Subbasin is part of the Goose Lake Valley Groundwater Basin which extends north into Lake County, Oregon. The valley is approximately 47 miles long and 12 miles wide. The basin is a downfaulted block with numerous bounding faults on the west and east side of the valley.

The subbasin is bounded on the north by Goose Lake, on the east by Pliocene and Tertiary basalt and Tertiary intrusive rocks of the Warner Mountains, and on the west by Pliocene basalt of the Modoc Plateau. The surface area of Goose Lake is variable given that the lake is an intermittent lake and has been completely dry several times since the early 1900's (DWR 1963). Several tributary streams flow into the subbasin from the Warner Mountains. At the southern end of the subbasin, tributary streams flow south to the North Fork Pit River. Annual precipitation ranges from 15- to 17-inches.

Hydrogeologic Information

Water-Bearing Formations

The primary water-bearing formations are Holocene sedimentary deposits (which include lake deposits, intermediate alluvium, and alluvial fan deposits), Pleistocene near-shore deposits, Pliocene to Pleistocene lava flows, and to a lesser extent, the Plio-Pleistocene Alturas Formation. The following summary of water-bearing formations is from DWR (1963).

Holocene Sedimentary Deposits. The lake deposits consist of unconsolidated interstratified clay and silty clay. Water produced from these sediments may be of poor quality depending on the degree of alkalinity. Thickness of the deposits ranges up to 1,000 feet.

The intermediate alluvium consists of unconsolidated, poorly sorted silt and sand with lenses of gravel up to a thickness of 100 feet. These zones are moderately permeable.

The alluvial fan deposits consist of unconsolidated to poorly consolidated, partially stratified sand, gravel, and silt with lenses of clay. These deposits are generally the most permeable of the valley sedimentary deposits. The eastside alluvial fans range up to 300 feet in thickness and are considered the most important groundwater source. The upper fan areas are moderately to highly permeable and, where saturated, can yield large amounts of water to wells. The mid- to lower fans are generally less permeable but contain confined zones yielding moderate amounts of water to wells. The west side fans, ranging in thickness to 100 feet, are less permeable resulting in low to moderate well yields.

Pleistocene Near-Shore Deposits. Near-shore deposits occur at the south end of the subbasin and overlie the basin in the southwest trending towards the northeast subbasin boundary. The deposits are moderately to highly permeable and may yield large quantities of water to wells.

Pleistocene Volcanic Rocks. The Pleistocene volcanic rocks consist of highly jointed flat lying basalt flows ranging from 50 to 200 feet in thickness with interbedded scoriaceous zones and pyroclastic rocks. In the surrounding upland, these rocks serve as a recharge zone; in the valley they interfinger with valley sediments and act as a forebay to water-bearing deposits. In general these rocks are highly permeable and can yield large amounts of water to wells.

Plio-Pleistocene Volcanic Rocks. The Plio-Pleistocene volcanic rocks consist of highly jointed basalt flows with some zones of scoria and interbedded pyroclastic rocks. The deposits range up to 500 feet in thickness. These rocks are generally highly permeable and are areas of recharge where exposed at the ground surface. Flows from the west side of the basin contain numerous permeable zones which likely provide large quantities of water to wells. On the east side of the basin, multiple flows of fractured lava are interbedded within the valley sedimentary deposits. Wells penetrating these rocks yield moderate to high quantities of water.

Plio-Pleistocene Alturas Formation. The Alturas Formation consists of slightly consolidated, well-bedded, tuffaceous sandstone and occurs at depth in the basin separating younger and older lava flows. The deposits are moderately permeable and may provide moderate amounts of confined water to deep wells. Thickness of the formation ranges up to 500 feet.

Recharge Areas

Upland recharge areas consist of permeable basalt flows of Pliocene to Pleistocene age. Precipitation and surface runoff infiltrates the basalt flows and percolates towards the valley recharging valley sediments. Most of the recharge to deeper aquifers along the east side of the California portion of Goose Lake Valley is derived from infiltration of surface water, generally along the foothill portions of stream channels. A relatively large portion of precipitation occurring along the west side of the valley infiltrates upland recharge areas (DWR 1963).

Groundwater Level Trends

Analysis incomplete.

Groundwater Storage

Groundwater storage to a depth of 500 feet is estimated to be 1,000,000 acre-feet (DWR 1963). The percentage of the 1,000,000 acre-feet located within Fandango Valley Subbasin is unknown. DWR (1963) notes that the amount of water that is useable is unknown.

Groundwater Budget (Type B)

Estimates of groundwater extraction for the Goose Lake Basin (including Lower Goose Lake Valley Subbasin and the Fandango Subbasin) are based

on a survey conducted by the California Department of Water Resources during 1997. The survey included land use and sources of water. Estimates of groundwater extraction for agricultural and municipal /industrial uses are 10,000, and 25 acre-feet respectively. Deep percolation from applied water is estimated to be 1,600 acre-feet.

Groundwater Quality

Characterization. Calcium bicarbonate type waters occur throughout the basin. The concentration of total dissolved solids averages 183 mg/L and ranges between 66- to 528-mg/L (DWR unpublished data).

Well Characteristics

	Well yields (gal/min)	
Irrigation	Range: 350– 2000	Average: 1117 (2 Well Completion Reports)
	Total depths (ft)	
Domestic	Range: 80 – 440	Average: 209 (32 Well Completion Reports)
Irrigation	Range: 212 – 865	Average: 520 (26 Well Completion Reports)

Active Monitoring Data

Agency	Parameter	Number of wells /measurement frequency
DWR	Groundwater levels	9 wells semi-annually
DWR	Miscellaneous Water Quality	9 wells biennially
Department of Health Services	Miscellaneous Water Quality	5

Basin Management

Groundwater management:	Modoc County adopted a groundwater management ordinance in 2000.
Water agencies	
Public	
Private	

Selected References

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Errata

Changes made to the basin description will be noted here.